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AUTHOR Barron, Colin
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ABSTRACT

A student-centered, cross-disciplinary approach was developed to teach English language skills to first-year architecture students at the Papua New Guinea University of Technology. The course addressed the problem of native architecture students' lack of training in oral skills and lack of experience in expressing familiar architectural concepts in Western terms, especially in written form. The students used real architectural input for the language classes, working individually, in pairs, and in groups to produce architectural projects from the design classes. By making use of the students' native artistic skills in the design classes and by exploiting their knowledge of concepts in traditional forms in both the design and language classes, the approach builds their understanding of the concepts in Western terms. In this way background knowledge is supplemented with new knowledge, and substantial communication skills are acquired. Appendixes include outline materials for the students prepared by members of the Department of Architecture and examples of student projects. (Author/MSE)

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CONCEPTS, CULTURE AND COMMUNICATION IN ARCHITECTURE

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Colin Barron
Department of Language and Social Science
Papua New Guinea University of Technology
Lae
Papua New Guinea

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Abstract

Successful architects require a wide range of communication skills. Traditionally these skills (oral presentation, cohesive writing, reading skills) have been taught in isolation from the real specialist studies. In addition, PNG students come from village backgrounds and are not used to expressing architectural concepts (e.g. space, aesthetics, energy systems (abstract), form, structure (concrete)) in western terms, especially in written form. However, the students are familiar with such concepts in their traditional forms. Many are also natural artists.

This paper describes a cross-disciplinary, student-centred approach to teaching language skills to first-year Architecture students at the Papua New Guinea University of Technology in Lae, using real architecture input for the Language classes. They work individually, in pairs and groups to produce projects set by the Architecture lecturers in the design classes. To help them with the projects, various exercises are set to the students in Language classes so that essential communication skills are practised and feedback on the students' progress in the projects is provided to the lecturers.

By making use of the students' native artistic skills in the design class and by exploiting their knowledge of the concepts in traditional forms in both the design and Language classes, their understanding of the concepts in western terms is built up. In this way background knowledge is supplemented with new knowledge and the students have something to communicate, not just an empty set of communication skills at the end of the course. The presentation will be illustrated with slides.

1. Introduction

The language course for the first-year Architecture students which I am teaching at the Papua New Guinea University of Technology enables me to put into practice my basic teaching philosophy which is to make the students confident in communication. Obviously this involves a student-centred approach. Also, as I am discussing an ESP programme in a technological university, there is the implication that the language course I am describing here should be as relevant to the students' specialist subject as possible. This latter point would seem to imply that I favour a narrow focus in ESP teaching which might involve making direct use of the students' textbooks in Architecture, for example. However, as I aim to show below, I am not a subscriber to the narrow view of teaching ESP because, firstly it does not add enough to the students' background knowledge (BGK). Secondly, it does not always enable an integrated, thematic programme to be followed because the materials are determined by external sources, i.e. they are chosen by the lecturers of the specialist subject. Thirdly, it does not help the students to become confident communicators in English because the Language classes do not provide a welcome break from the specialist courses and therefore they could lead to boredom, which is not conducive to efficient communication. One of the purposes of this paper is to show how a wide perspective in ESP teaching better fulfils my basic philosophy of making the students confident communicators in English.

My second aim in this paper is to demonstrate how recent theories in schema theory can be applied to practical language teaching to produce

a course structure which can be filled in with relevant materials that add to the students' BGK and thereby give them something with which to communicate.

A third aim is to give a practical example of the first two aims, i.e, a wide perspective in ESP teaching and the application of schema theory to language teaching. This will be done by describing the first part of the course.

2. Communication

The aim of the course for first-year Architecture students at the PNG University of Technology is to provide them with a set of skills which will be of use to them not only at university but in some cases throughout their professional careers. The skill areas follow the four traditional language skills of reading, writing, listening and speaking.

Confidence in communication first of all means being able to approach a text of any length without fear and trepidation and to get from it the maximum amount of information necessary for one's purposes. Therefore, one of the main aims of the course is to improve the students' reading skills. "Reading is an interactive process between the reader and the text" (Carrell 1983:200). Carrell further states that non-native speakers are poor text processors because they utilise only bottom-up processing when reading (Carrell 1983:199). Efficient reading is the interaction between bottom-up and top-down processing (Carrell

1983:199; Schallert 1982: 28). In top-down processing readers make cognitive predictions based on a sampling of the text and application of background knowledge (BGK). In bottom-up processing the reader makes use of textual clues, particularly lexical clues, to confirm these predictions (Brown and Yule 1983:234; Carrell 1983:199). One consequence of utilising only bottom-up processing is that the reader tends to think that meaning resides solely in the text (Carrell 1983:200), but

> "meaning is constructed out of the interaction between a reader's activated background knowledge and what's in the text. If a reader is not actively using his or her background knowledge, a significant part of the reading process isn't taking place, and the construction of meaning suffers" (Carrell 1983:200).

Thus, utilising only bottom-up processing results in the reader considering the text as product (Brown and Yule 1983:24), and although students become experts in reading a particular text, they do not become experts in reading texts. Therefore, one aim of the course under discussion is to make the students aware of the necessity of regarding texts as "discourse-as-process" (Brown and Yule 1983:24). This approach adds to the students' BGK and hence their World View, which is "the way a people characteristically look out upon the universe" (Redfield 1953:85). World View is therefore what Schallert (1982) calls 'schema'. This will be discussed in section 3 below. The purpose of the texts used in the course is to add to the students' BGK, and in so doing to change their schemata (or World View), as will be

shown in section 5 below. (See also Appendix 2 for examples of texts.) In this I am following research into cognitive psychology in which

> 'pedagogy ... has as its central kernel the principle: 'new meanings are acquired by the interaction of new knowledge with previously learned concepts or propositions'" Schallert 1982:16, quoting Ausubel, Novak and Hanesian 1978:127).

The reading texts vary in both length and format (see the examples in Appendix 2) to encourage the students firstly not to be afraid of long texts so that they can approach a textbook confidently, and secondly to emphasise the close relationship between linear and non-linear texts and the considerable amount of information that can be gained from both kinds of texts.

The new information gained from the reading texts is used to provide practice in various writing skills. The product of each of the four modules described below in section 4 is a written presentation that consists of both written and graphic material (see Appendix 3). Here close collaboration with the Architecture lecturers becomes essential because the graphics are taught in the Architecture design classes on Tuesday and Thursday afternoons, which I am able to attend.

Before the final presentation in each module, the students undertake a series of writing skills exercises, such as writing summaries and preparing brief presentations on different aspects of the module. The purposes of this are:

1. to provide feedback on the students' progress

2. to emphasise writing as a process

3. to act as data-gathering exercises for the students' final presentations.

The writing-as-process emphasis is also intimated to the students by the modular structure of the course in which there are thematic links both within the modules and between the modules. Thus, each writing exercise is seen as one step towards the final presentation.

By now it will be realised that the emphasis is at the semantic level, rather than the grammatical level. Three levels in the coding system of language are generally recognised, viz: "the semantic (meanings), the lexicogrammatical (forms) and the phonological and orthographic (expressions)" (Halliday and Hasan 1976:5). With rare exceptions, PNG students do not have problems at the second and third levels. It is at the semantic level, and particularly with cohesion and coherence, that the students have writing problems. Halliday and Hasan state that "The concept of cohesion is a semantic one" (Halliday and Hasan 1976:4). Cohesion is "where INTERPRETATION of some element in the discourse is dependent on that of another" (Halliday and Hasan 1976:4). Empirical research by a colleague of mine at the PNG University of Technology shows that students only relate a limited number of propositions across a text (Henzell-Thomas, forthcoming). This research relates to reading, but the same limitations are to be found in the students' written work. Students' written work is sometimes difficult to decode because propositions do not refer to one another. Here is an example:

> "Technology has always existed in developing countries and they don't go far out to get their engineering materials."
> (Foundation year Engineering student, 1985)

(There are two propositions here:

1. Technology has always existed in developing countries
2. Bush materials are readily available.)

The two propositions lack coherence because there is no overt cohesive marker linking them. The students' writing does not function as discourse. This applies to both the linear and non-linear parts of their written work. Thus, the coherence of their work is affected because the relationship between the propositions is not clear (Widdowson 1978:28-29).

The distinction has to be made "between the 'meaning relations' which hold between items in a text and the explicit expression of those 'meaning relations' within a text" (Brown and Yule 1983:195). This distinction is not made clear by Halliday and Hasan (1976), as Brown and Yule state (1983:195). This distinction is explicit in the course I am describing by the two basic aims of the writing component. The initial aim of the writing component of the course for the first-year Architecture students is to teach them the overt (explicit) verbal elements so that they can employ them in their written work. Such overt elements include 'however', 'for example', 'on the one hand ...', etc.

The second aim of the writing component of the course is to make the

students realise that there should be semantic relations holding between propositions in their work. The taxonomy of variables of the schema discussed in section 3 below provides the basis for demonstrating these relationships.

The input for practice in writing coherently and cohesively is provided by the reading texts. The controlled writing tasks such as summaries are used to teach the use of overt verbal markers of cohesion. Oral presentations before major written presentations are used to fix the schema of the topic in the students' minds and thus to establish the semantic relationships between the propositions of the schema. Writing is taught as a process in which all the writing tasks are linked together, not as a product in which each task is an end in itself.

The third important skill which is emphasised in the course is oral presentations, which complement both the reading and the writing skills. Again, this is seen as a process rather than a product in which the students get the information for their oral presentations from the texts and their BGK. An important part of the oral presentations is the appropriate use of visual aids.

The oral presentations provide feedback on both the students' acquisition of new information and their ability to present information efficiently, i.e. coherently and cohesively. It thus complements the written presentations and gives practice with the material before the written presentation is expected. In this way the students are prepared thoroughly for their major written presentations and can approach them with confidence.

Thus, the skills are not practised in an ad hoc manner, but are thematically linked so that the students have something to communicate at the end of each module and not just an empty set of communication skills.

The thematic approach operates on two levels, which will be described in section 3 below. Thematisation of the information goes a long way to ensuring that the students see the relevance of what they are doing and therefore they are more confident in their communication.

Another important aspect of the course is to encourage the students to communicate their natural talents. Many of the students in PNG are natural artists, especially those who choose to study Architecture, and these artistic abilities are deliberately exploited in the first-year course. This is largely achieved by insisting that both the oral and the written presentations are accompanied by graphics. The purpose of this emphasis on the use of graphics is threefold:

1. it gives the students encouragement and confidence, particularly those who find it difficult to express themselves in writing

2. it teaches and reinforces the important connection between written or printed text and illustrations and the great value that illustrations have in the communication process

3. as stated previously, it establishes the link between the Language and the Architecture classes and thus makes the Language classes very relevant in the eyes of the students.

The overall aim in teaching these communication skills is to encourage the students to use language "to organize their thoughts" (Cherry 1966:4). The thematic approach both within modules and between modules mirrors life as "a continuity of experience" (Cherry 1966:17) so that the students World Views (or schemata) are developed to produce a "society of people in communication" (Cherry 1966:4).

3. Concepts

In order to organise their thoughts, the students need a structure on which to base that organisation. The structure I have adopted consists of a hierarchy of concepts that are ordered in a prearranged fashion so that the students' memories are not overloaded. A concept is a high order variable in one's schema. Schemata are "abstract structures that represent what one holds to be generally true about the world" (Schallert 1982:20), i.e. they are the same as Redfield's (1953) World View. "Schema theory and the several theoretical positions that bear a close family resemblance to it, represent a serious attempt at postulating the underlying mechanisms by which comprehension and knowledge acquisition occur" (Schallert 1982:14). Schemata, then, provide the underlying structure on which the students organise their knowledge. In other words, schemata represent organised knowledge rather than isolated bits of information.

"Schemata are meant to represent all kinds of knowledge" (Schallert 1982:21). Therefore, schemata of Architecture can be represented in the students. But the students have not studied Architecture before

they come to the university, so their schemata of this subject is very limited, but not completely empty. One notable feature of the students and one which is exploited at the beginning of the course particularly, is that many of the students have already had practical experience of Architecture by helping to build their houses in their villages. The students therefore already have some concepts related to Architecture in their schemata, even if these concepts do not correspond exactly with western concepts in the subject. This is why the first module of the course is entitled 'My House and Village' (see Fig. 2). It enables the students to talk and write about something familiar, their house and village and to make use of their BGK. However, the Language course changes their schemata, as will be explained in section 5 below. Successful communication takes place if the students' schemata are changed. This is a natural process, as Schallert explains,

> "the configuration of the schemata making up one's knowledge is not static, but dynamic, and changes from moment to moment in response to communication process demands" (Schallert 1982:22).

The items in the schemata are variables which acquire more and more levels as knowledge changes (Schallert 1982:24), i.e. the structure is a taxonomy of concepts and sub-concepts which become more and more elaborate. One of the aims of the language course I am describing is to establish the highest order variables in the schemata as the foundation of the course, and then to determine gradually the order of the variables in subsequent lower levels of the schemata so that comprehension can take place in a way that does not overload the

students' memories. "Comprehension proceeds as the variables of the schemata are determined" (Schallert 1982:27). I will discuss below how this is tackled, but briefly, very few of the variables for the students' schemata are taught in the Architecture design classes. The responsibility for this falls onto the Language classes. As the underlying procedure is to provide the students with more and more levels of variables as the course proceeds, initially only one variable (or concepts as they are called in the course) is provided, which is sub-divided into sub-variables. The variable that is introduced at the beginning of the course is variable itself, and the sub-divisions are rainfall, temperature and altitude (the topic being climate). This is the content of section 5 below. Soon after this another variable is introduced, constants, together with some sub-variables, e.g. community (Olgyay 1963:8-9), phi (= the Golden Number, 1.618) (Rowland 1965:6-7). In this way the structure starts to emerge and the students have something around which to organise their learning. As the course proceeds more and more variables are acquired and so the students' "schemata develop (and) become more elaborate and more specific with experience" (Schallert 1982:24).

However, it is not sufficient to provide variables for the students. The variables must have values that are seen to be significant if they are to form part of the students' BGK. "Information that cannot fulfill a variable is perceived as less important, irrelevant, incongruous" (Schallert 1982:29). This obviously has important implications for language teaching because the information we provide has to be significant if the students are to give a value to the variables of the input information and thereby acquire knowledge. I

would suggest that this provides support for ESP programmes because they are designed to be significant for the students. (I am assuming that this is what is intended by 'specific purposes.') But this does not necessarily imply that the 'S' in ESP has to be narrow by concentrating on the input material of the specialist courses.

In analysing the values of the variables in schemata we return to top-down and bottom-up processing because they "are determined as the result of the interplay of bottom-up and top-down processes" (Schallert 1982: 28). But I have mentioned above that the students have very little BGK of Architecture when they enter the university and therefore their acquisition of new information is severely constrained.

> "It seems the acquisition of new knowledge reflects the level of sophistication of existing knowledge structures" (and) the more one knows about a concept the more organized that knowledge is and the more systematic and orderly will be the acquisition of new information" (Schallert 1982:39).

One of the basic aims of the language course for the Architecture students is to increase the sophistication of the students' knowledge structures so that not only is their acquisition of new information systematic and orderly, but also their schemata are changed and their ways of looking at reality are changed (Schallert 1982:41). To achieve this, the information has to be significant. The next two sections of this paper describe how the language course is organised so that the taxonomy of variables in the students' schemata is caused to be changed at two levels:

1. at the topic level in which the progress is from the known to the unknown so that known concepts are exploited to cause dynamic changes in the students' schemata and existing knowledge structures are utilised, and

2. at the modular level in which higher order concepts (variables of the schema) are introduced in an organised way before sub-concepts (sub-variables of the schema) so that comprehension can take place as the values of the variables of the schema are realised. In this way learning can be seen to be organised.

The student-centred approach which this method entails can be seen in figure 1:

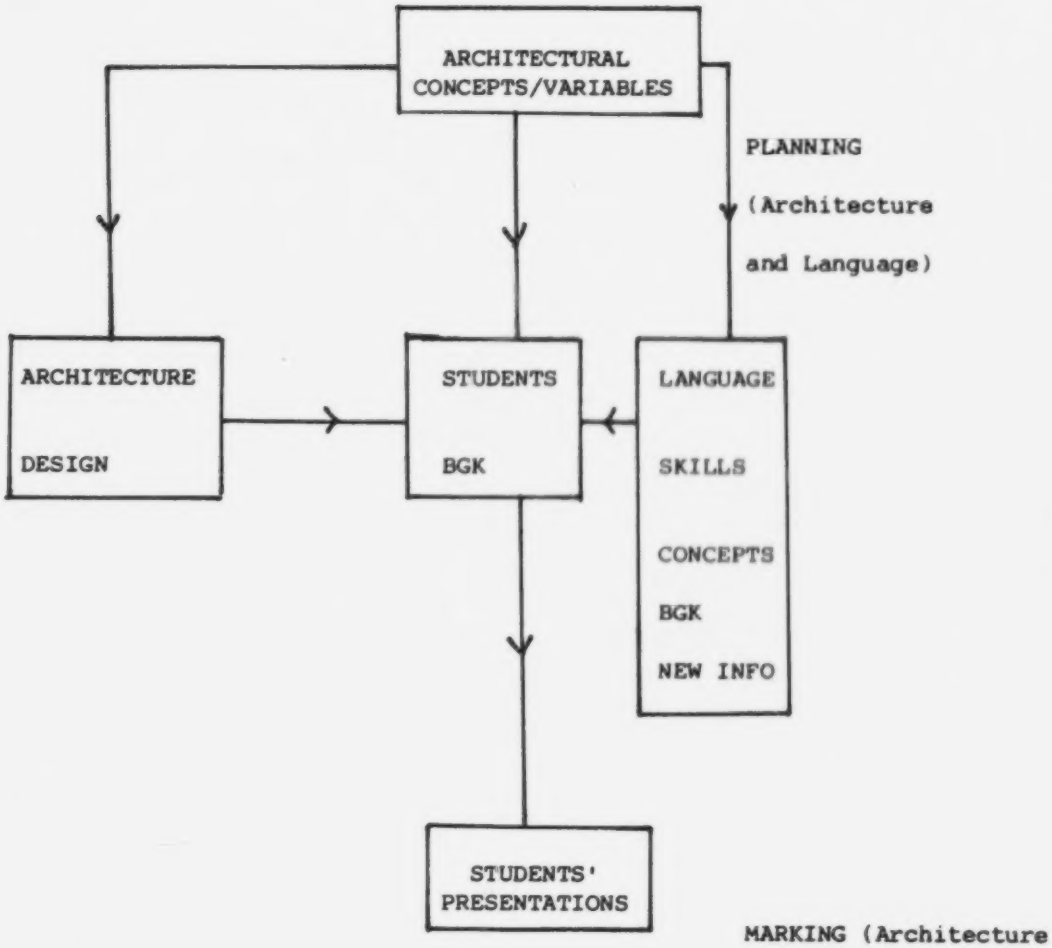

Fig. 1
Student-Centred Approach
to Communication Teaching

Appendix 1 contains the outline of the variables for Module 1 that is given to the students.

4. Course Outline

It will be deduced from fig. 1 that the example of team teaching I am describing is one of collaboration rather than intervention (Nolasco 1981:126) in which the Language and the Architecture lecturers collaborate on the planning, materials and marking, but do not share the classroom teaching.

The course for the first-year Architecture students consists of four modules of differing lengths:

1. My House and Village (Semester I, weeks 1-10)
2. Lae (Semester I, weeks 11-15)
3. Culture Study (Semester II, weeks 1-8)
4. The Man-Made Environment (Semester II, weeks 9-15)

(See Fig. 2)

The basis of the Language courses is shown in the first column of figure 2 (next page). The second and third columns show the material taught in the Architecture design classes.

WORKSCHEDULE.

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WEEK			
1	WELCOME...Introduction of Curriculum Programme.....Distribution and explanation of Workbook.....Brief on Equipment, materials, booklist....		Introduce to LINE and DOTS on PLANES...black and white...
2	WORKBOOK...First Chapter Introduction..... MY VILLAGE.	Introduction to LINE WORK using Pencil, pen, still life and objects	
3			GEOMETRIC Forms and Shapes....
4	workbook review NATURAL ENVIRONMENT.	LIFE	.Pictorial Depth .Value of Tones
5		MODEL	
6			PATTERNS and TEXTURES
7	workbook review..... SOCIAL CULTURAL, CUSTOMARY STUDIES	Freehand sketches and thumbnail drawings	
	MID-SEMESTER BREAK.		
8	LIFESTYLE	MECHANICAL PROJECTIONS .Isometric	Patterns and Textures .Composition .Organisation
9	MY HOUSE.	.Axonometric	Paper cut
10	workbook review	.Perspective .Shades and Shadows	.Ink or colour Construction papers
11	workbook...Second Chapter... introduction "WALK TRU' LAB"		COLOUR STUDY
12			
13		Pencil or black and white	Colour
14	workbook review	RENDERING	RENDERING
15	workbook...Third Chapter introduction... SEPIK TRIP.....		
	SEMESTER BREAK. TRIP TO THE SEPIK.		
1		DESIGN OF A POSTER design project 1	MECHANICAL PROJECTIONS.. Lettering, titleblocks, symbols, scales, textures, signs, lines, tools, numbering
2			
3	workbook review	DESIGN OF THE BOX design project 2	.Orthographic projections .Drawings Components
4		ANTHROPOMETRIC STUDY: SPACE & SCALE design project 3	.Model making
5			.Contours
6	workbook review	DESIGN OF THE CHAIR design project 3 & 4	.Perspective .Design analytical drawings.
7	workbook Fourth Chapter introduction. ENERGY SYSTEMS. CONTROLLED.		
	MID-SEMESTER BREAK ... TRIP TO PORT MORESBY ...		
8	URBAN FORMS AND SPACES	DESIGN OF AN ENTRANCE TO A PUBLIC BUILDING. design project 4 5	
9			
10	workbook review URBAN FORCES		
11			
12	PERSONAL SPACE AND PUBLIC SPACE workbook review	DESIGN OF A WOOD PAVILION FOR A PLAY-GROUND GARDEN design project 5 6	
13			
14	INTERGRATION OF THE MODERN AND TRADITIONAL.		
15			

CULTURES' STUDY

MY HOUSE AND VILLAGE

LAB ENVIRONMENT

MAN-MADE ENVIRONMENT

Figure 2
Work Schedule

The progression therefore is from the known to the unknown, i.e. from the students' home environment in the village to their current environment (the city of Lae where the PNG University of Technology is located), then to Papua New Guinea as a whole via the cultural study, and finally to the wider world of the man-made environment.

The aims therefore are:

1. to make use of the students' BGK so that more information can be added to it

2. to provide a hierarchy of variables in their schemata so that learning is systematic and organised

3. to ensure that the information is significant so that the variables can be fulfilled

4. to make the students' schemata develop along lines that become more elaborate and more specific through the course

5. to cause a change in the students' schemata, i.e. to inform them.

A closer look at the first module, My House and Village, will provide a short overview of some of the details. The module is divided into three blocks, as follows:

1. The Natural Environment
2. Social Study and Lifestyle
3. My House and Village

The first two blocks act as input for the final block. The purposes of this are:

1. to give the students practice in preparing presentations
2. to provide feedback on students' progress
3. to act as data-gathering exercises for the students

Therefore, the first two blocks are analytical and the last one is a synthesis of the first two.

The rationale for this choice of topics has a firm basis in the teaching of Architecture. "Both physical and socio-cultural aspects need to be considered, but the latter need primary stress" (Rapoport 1969:46). This is why one complete module is devoted to a study of culture (Module 3).

The reason why the first module is concerned with the students' houses and villages is not just because the topic is known. There is a firm architectural basis here too. As Olgyay states, "Architectural expression must be preceded by study of the variables in climate, biology, and technology" (Olgyay 1963:11). Therefore, climate was chosen as the first topic to be studied. The second topic, social study and lifestyle, also has a firm architectural basis:

> "My basic hypothesis ... is that house form is not simply the result of physical forces or any single causal factor, but is the consequence of a whole range of socio-cultural factors seen in their broadest terms. Form is in turn modified by climatic conditions (the physical environment which makes some things impossible and encourages others) and by methods of construction, materials available, and the technology ... I will call the socio-cultural forces primary, and the others secondary or modifying" (Rapoport 1969:47).

So, the first topics in the course have been carefully chosen to follow one method followed in the study of Architecture. In addition they help to activate the students' BGK.

But, even with the familiar information represented in the first module, the students' BGK is enhanced as I aim to show in section 5 below. The result of the module is to change the students' schemata of their village and to make them more elaborate.

Now, it will have been noticed that the information presented in the modules is not narrowly architectural in focus. It consists of geographical knowledge lergely learnt by the students at school, and general knowledge of their culture and lifestyle. So the information fits into the students' existing knowledge structures. At the same time, the information is new because, if you refer to fig. 2 (p.18), the information taught in the Language classes is not taught in the Architecture classes. However, it is significant because it is

required by both the Language and Architecture courses in the students' presentations. The information is therefore perceived by the students as being both relevant and significant. It is not so sophisticated that learning cannot take place.

The focus of the context of the Language classes is what the students generally know about the world and should now provide more evidence of what I mean when I say that a wide focus in ESP teaching is not only possible but can also add considerably to the students' BGK by elaborating on their schemata so that their thoughts are organised and their acquisition of new information "is systematic and orderly" (Schallert 1982:39).

5. Examples of Teaching Materials

The teaching materials I am about to describe here are from the very beginning of the course, i.e. from Module 1 - My House and Village. The topic is the Natural Environment. It took six teaching hours (of 50 minutes each). The students' materials can be found in Appendix 2.

The highest level of the schema is occupied by the concepts of 'variables' and 'constants', and the sub-variables are rainfall, temperature and altitude. The hierarchy has therefore been established. Constants will be discussed in the oral presentation of this paper.

The reasons for choosing this topic as the first one are:

1. as we have seen, the school of Architecture represented by Olgyay and Rapoport regards the physical environment and socio-cultural factors as primary, and therefore as the foundation for a study of Architecture

2. the topic is familiar to the students, both from their BGK of their villages and from school geography. However, it provides the chance to introduce new information and therefore serves the purpose of developing the students' schemata from the starting-point of a known topic

3. it provides the opportunity to teach and practise the use of both linear and non-linear texts at the beginning of the course, as will be described below.

At the beginning of the course the students are asked to prepare a five-minute talk on their house and village. The purposes of this are:

1. to get them thinking about the topic, i.e. activating BGK
2. to introduce themselves to the rest of the class
3. to act as a source of information for their written presentations.

Two students gave a talk in each lesson for the first two weeks of the semester.

The first task was a brainstorming session in which the students had to think about their village climate by answering the questions given on the task sheet given out with the climate histograms. (Appendix 2,

page 47) Thus BGK was being activated. Having then some ideas in their mind about their village climates, they were asked to look at the 16 histograms (Appendix 2, pp.48-50) in order to find the histogram which most closely resembled the climate of their village (this was largely done at home), i.e. reading non-linear texts and making use of BGK to develop schemata. The 16 histograms constituted the first text (Ford 1974:9). The purpose was to show the students how to read a non-linear text of this kind, which is the purpose of the third set of questions on page 47. In other words, to 'read' the text they had to deduce certain information such as whether the station is in the northern or the southern hemisphere, and also to establish the variables of rainfall, temperature and altitude. This practised how to read a non-linear text and obtain from it new information.

The second text consisted of two other kinds of non-linear texts, i.e. maps and a table, and a linear text (Appendix 2, pp.52-53) (Spenceley nd(a):94-95). This text was introduced 'backwards', i.e. the maps were discussed first in order to see whether there were any broad features that could be determined . Thus it activated the students' BGK. Values for variables were determined and comprehension was proceeding. From this the students were able to work out that there are three different climates in PNG, and these facts were noted down, practising note-making from a text. Then we turned to the table (p.52) to try and determine definitions for such terms as 'heavy rain', 'intermediate rain' and 'light rain' that occurred in the texts, i.e. vocabulary building. This was done by looking at the rainfall figures for particular stations in the table (column 2) and using BGK to define these terms. Thus the sub-variables were determined.

The schema had become somewhat elaborate by this stage, so a summary was necessary because the amount of information was becoming too large to handle by the memory. The summary took the form of a table, confirming the existence of three different climates in PNG and providing more information on the places which experience similar climates. Therefore comprehension is proceeding because the information is new and the students' BGK has been enhanced.

The purposes of this were:

1. to show the students that information of this kind has to be summarised when it threatens to get too big

2. to show that a summary is not necessarily one-third of a linear text, which is the traditional method of writing summaries and which is the one most familiar to the students in PNG

3. to show that an appropriate form of summary has to be chosen which will best display the information

4. to confirm the initial hypothesis.

Then we turned to the linear text. Not all of it was read by the students (Appendix 2, p.52). The items in italics were noted (i.e. the different rainfall regimes), and from this information the students realised that the summary table would have to be changed because the key concept is dominant versus continuous rain. Therefore, this

information had to be added to the table, i.e. the students' schemata had been changed.

From this second table the students deduced that there are in fact five climates in PNG, consisting of three main climatic types and two sub-types. This was confirmed when they were given the third text, the climate map of PNG (Appendix 2, p.55) (Spenceley nd(b):97).

In order to relate this new information to Architecture and to the students' BGK, the information was reinforced by showing them slides of different kinds of houses in PNG and asking them what they thought the climate was like by considering such details as roof type, materials, wall type and background vegetation. In addition, the fact that these climatic types are world-wide and not restricted to PNG was shown by the first slide, Koppen's classification of the world's climates. The values of the variables in the hierarchy were thus increased.

This practical material was followed by a theoretical text on the topic (Olgyay 1963:1-13).

New information was added to the students' BGK in the following ways:

1. the information deduced from the 16 histograms, i.e. proximity of the station to the Equator, whether it is in the northern or the southern hemisphere, and the number of seasons and when they occur

2. the fact that there are five different climates in PNG

3. in some cases, detailed information, e.g. on the amount of rain in particular areas

4. Koppen's classification of the climates of the world

5. alternative methods of writing summaries.

The topic is, then, familiar to the students, but they still added to their BGK. The materials introduce to the students both linear and non-linear texts and how they may be read efficiently. Finally, by selecting a foundation for the study of Architecture that is favoured by at least one school of thought in Architecture, the course has kept away from a narrow viewpoint of teaching communication skills to Architecture students.

6. Conclusion

Cognitive psychology provides us with schema theory which in turn provides the structure for the course I have described in this paper. The main concepts of schema theory of knowledge are organisation, meaningfulness and context (Schallert 1982:14). We have seen how the organisation of variables in the schema are arranged in hierarchical fashion to provide a minimum set of items at any one stage in the course that will not overload the students' short-term memories. As a result, the materials are more likely to be remembered, particularly if they are significant and seen to be relevant for the students' needs. Context plays a key role in influencing how much is remembered as well

as what is remembered from a text (Schallert 1982:18). In other words, if these conditions are met, the materials of a course will be more meaningful.

I hope I have demonstrated that context (i.e. input material) does not have to be narrowly specific in order to be significant. Basic foundations are better utilised at this initial stage of learning in a specialist subject, rather than material adopted directly from the students' textbooks. In this way the Language classes are not seen as an optional extra and also perhaps at the same time seen to be boring, both of which inhibit real communication, but as an essential part of their learning process at university.

The students have a structure on which to base their information and thus have something to communicate. An atmosphere conducive to good communication is achieved and the students can learn to communicate in English with confidence.

Acknowledgements

I would like to take this opportunity to thank Kathy Upton and Lohia Henao, lecturers in the Department of Architecture and Building at the PNG University of Technology, without whose considerable co-operation this collaborative course would not have been possible. I would also like to thank Rahim Milani of the same department for his assistance. I have benefitted greatly from discussions with all three lecturers.

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Note: the references include items used for both this written paper and the oral presentation at the Regional Language Centre in Singapore in April 1985.

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APPENDIX 1

Chapter One

My Village and My House

Outline materials for the students prepared by members of the Department of Architecture and Building at the Papua New Guinea University of Technology

CHAPTER ONE

MY VILLAGE AND MY HOUSE

I N T R O D U C T I O N:

The Country of Papua New Guinea is made up of thousands of very small villages, all located near rivers, near the seashores in the valleys, on mountain ridges or in the middle of large flat open grass plains.

These villages have existed for generations, and over the years changes have taken place in those villages which has resulted in what we see of them now, nevertheless everyone of those village has a sense of identity and unique beauty about it.

Geographically, Culturally, Climatically and even spiritually there is something special and unique about them all.

There has been a tendency in the development of Papua New Guinea for the educated generation to neglect and forget their origins (the villages), however, recently there has been a realization of how important villages are as Bernard Narokobi puts it in his book "The Melanesian Way".

A Melanesian village is a vital and dynamic human institution. It is not the shapeless, impersonal, juristic layout of buildings a modern suburban city is.

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A village is a cultural unit, an organ of civilsation, technology, agriculture and enterprise

It's like living among a young family that's busy growing. All its members apply their talents at their own pace, without promises or inducements of higher pay, overseas travel or promotion. People work because it is right to work and eat because it is pleasurable to eat.

The Chapter of the Wookbook should be viewed from this perspective. Only then will you wind it satisfying and worthwhile recording and conveying the wealth of your Village.

WHERE AND HOW DO WE START?

In this Chapter you will be recalling (from memory) data (information) about your village, analysing them and present them through literal and graphical, pictorial and photographical means.

Let us start by asking ourselves some basic questions, and try and answer them.

Our Answers could be presented in many ways.

- plans
- sketches
- photo surveys
- photographs etc.

Therefore, as we combine both literal and graphical means of communicating information about our villages, it will help other people as well as us to better visualize what we intend to say about the unique "My Village".

THE STIMULANTS

PART A:	
1. What is the name of the Village?	
2. What does the name mean?	
3. Who owns the Village?	

PART B:	
1. Where is the village located?	
2. Why is the village located there?	

PART C:	
1. How big is the village? How many houses? How many people? Who owns the houses?	
2. How strong is the traditions and the cultures of the people in the village. - Are the houses in clusters? - Do the men and women live together?	

10

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PART D:	
1. What kind of lifestyle do the people have? - language?	
2. What is the staple food? - Style of cooking? - Style of dress?	
3. What is the normal everyday programme?	
4. Any superimposed rules and programmes of investment by e.g. the local government councils?	

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PART E:	
1. What kind of Traditional beliefs does your village have?	
2. Any social order? e.g. Chiefs etc.	
3. What is the practice in areas of - Marriage - Births - Deaths etc.	
4. Any significant trade of wealths, food etc.?	

12

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PART F:	
1. What is the Climate like? - Sun - Rain - Humidity - Wind etc.	
2. Geography - landforms - topography - soils - water etc.	
3. Vegetation - forests - trees - cultivated food plants etc.	
4. Fauna - animals - birds - insects etc.	

13

PART G:	
1. What is my house made of? - posts - floor - roof - walls etc.	
2. How big is the House?	
3. What type of Construction system is used?	

PART H:	
1. What other interesting things are there about your village. - graphics - symbols - tattoos - dances	
- legends - colours - clothes etc.	

S U M M A R Y:

This exercise may seemed a drain on your conception of the wealth of your village, but I Am sure you will agree with me that it is like working to create a vision, new hope and new life, for as B. Narakobi puts it in "The Melanesian Way".

The Heritage of Papua New Guinea is ours and our childrens. Our joy is to do our bit well so that we pass onto our successors our experiences and our visions and hopes.

Over to you!!!

16

APPENDIX 2

Teaching Materials for the first part of Module 1

The Natural Environment

PROJECT 1 MY HOUSE AND VILLAGE

ORAL PRESENTATION

Task: To describe in 5 minutes your house and village to the rest of the class.

Purpose:
1. To start you thinking about your house, your village and their relationship with the wider world.
2. To give you practice in public speaking.
3. To present information efficiently in a short space of time.

Some suggestions: You have only 5 minutes, so do not try to describe everything in your village, or even in your house. Take one or two features that are either important or interesting and talk about those only. Think in particular how your house relates to the rest of the village.

You will have to locate your village within PNG and you will have to locate your house within the village so that your audience (the rest of the class) fully understands the location of the two.

Therefore, one way of presenting your information is to talk briefly about the wider view (i.e. PNG and your village) and to go on to the narrower view (i.e. your house). In other words, to go from

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the general to the specific. But this is not the only way of approaching this kind of task.

Aids: If you want to use visual aids, please let me know beforehand.

Time: The talks will start on Monday 25 February 1985. Two students will talk during each class until all students have had a chance to talk abput their house and village.

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CLIMATE HISTOGRAMS

TASKS

1. Think about the climate in your village.

   Which are the warmest months ?
   Which are the coolest months ?
   Which are the wettest months ?
   Which are the driest months ?
   Do the warmest and wettest months coincide ?
   Do the coolest and driest months coincide ?
   How much rain falls in a year ? (in mm.)
   What are the average maximum and minimum temperatures during the year ?

2. Write down these facts.

3. Look at the 16 climate histograms.
   Which one illustrates the climate of your village best ?

   Notes: Pay attention to the following details:
   1. altitude of the station
   2. average temperature
   3. temperature range each month
   4. amount of rain each month
   5. wettest and driest periods of the year

4. Now answer these questions :

   1. How do you know by looking at these histograms that PNG is south of the Equator ?

   2. Look again at the histogram you have chosen. How many seasons are there?

      When do they begin and end?

   3. Which of the 16 stations is nearest to the Equator ?

      How do you know ?

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LA 110

CLIMATE HISTOGRAMS

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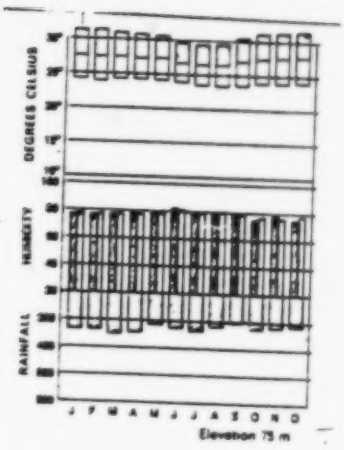

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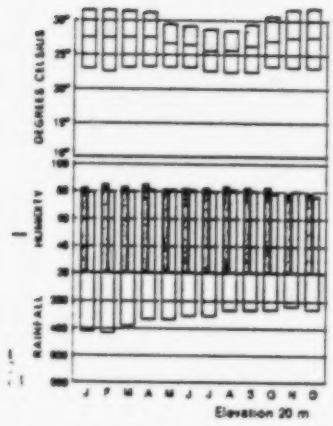

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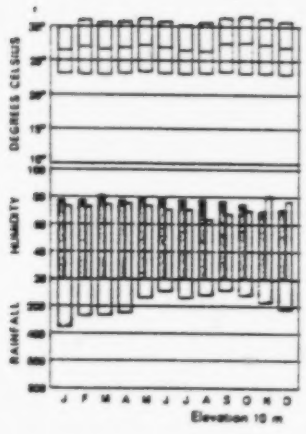

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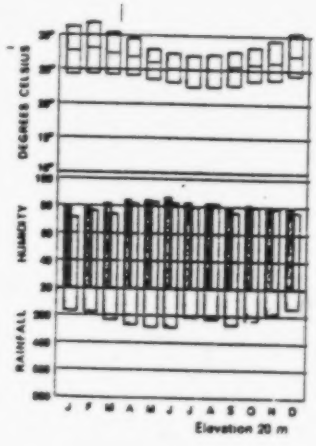

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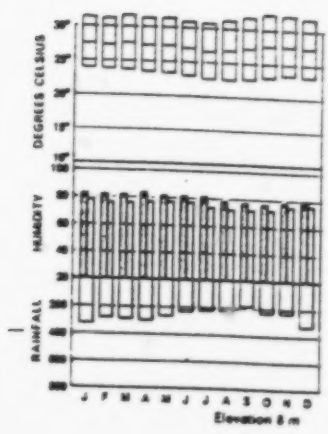

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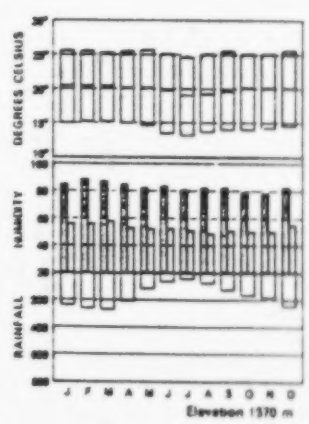

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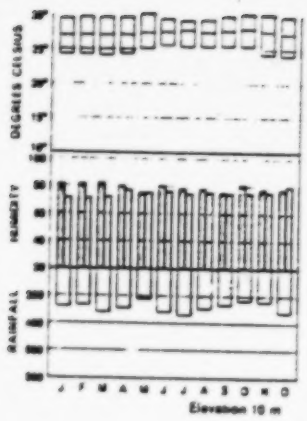

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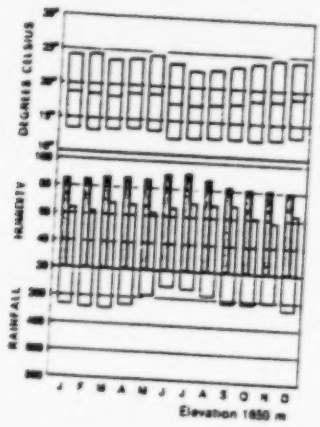

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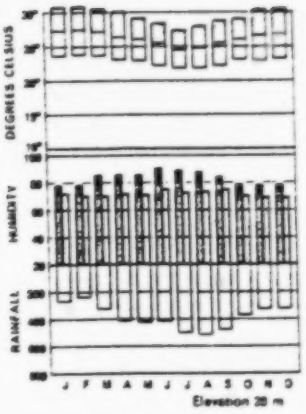

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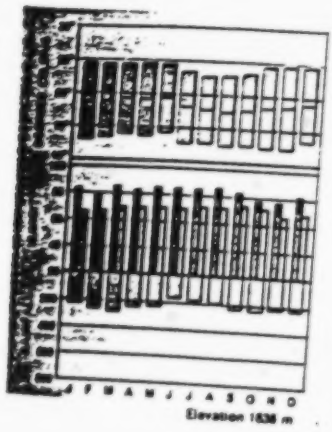

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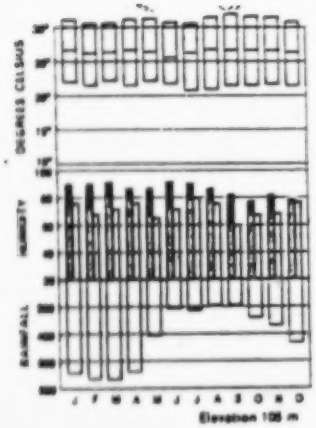

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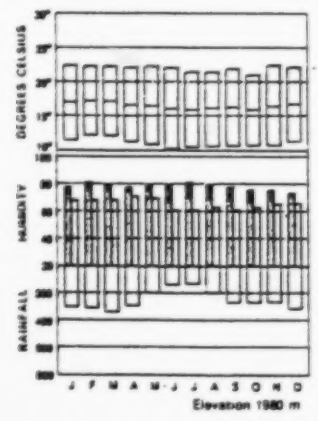

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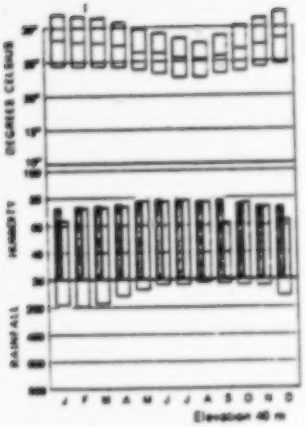

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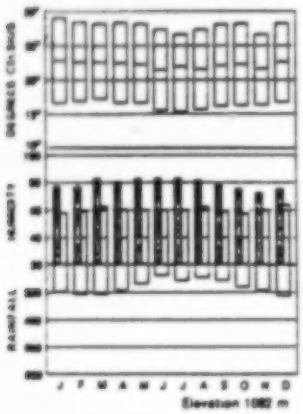

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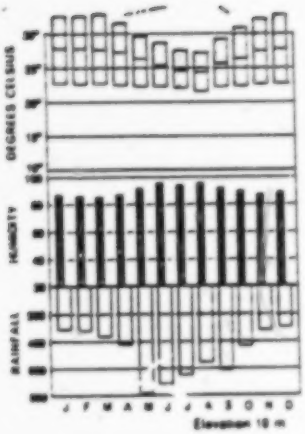

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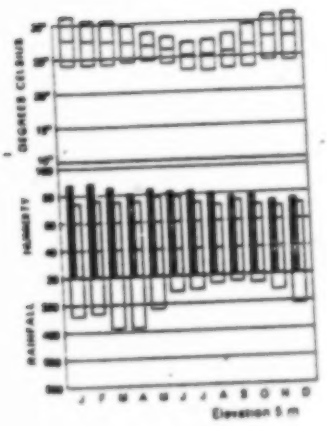

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LA 110

CLIMATE HISTOGRAMS

1. Kieta
2. Losuia
3. Rabaul
4. Samarai
5. Kavieng
6. Goroka
7. Momota
8. Mt Hagen
9. Lae
10. Tari
11. Aiome
12. Wabag
13. Port Moresby
14. Wau
15. Kikori
16. Daru

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RAINFALL AND TEMPERATURE

By A.P. Spenceley
Geography Department, University of Papua New Guinea

Two surface pressure systems influence the climate of Papua New Guinea. From about May to August the country is influenced predominantly by the Trade winds. These winds originate from the sub-tropical high pressure system which is located 25°-30° S. The winds, which blow from the south eastern quarter, have a high constancy of direction and speed. Wind strengths of up to 25-30 knots are common late in the season. Lower velocities occur at the start of the season. From January to April, the country is influnced by the Inter-tropical Convergence Zone (ITCZ). This zone represents the junction between air streams originating in the northern and southern hemispheres. This zone passes over Papua New Guinea twice, lagging behind the apparent movement of the overhead sun. As the zone passes south over Papua New Guinea the country comes under the influence of moist north westerly winds. September represents a transitional period between these two systems.

Rainfall

The effect of topography on precipitation is quite noticeable. Where the relief is low and parallels the prevailing winds, little rainfall is produced. However, the presence of the central mountain chain on the main island forces the air upwards, inducing instability, causing rain to fall on the windward slopes. In the lee of mountain, the descending air, which often incorporates air from the upper trade winds, induces dry conditions. A reverse situation prevails when the north westerly winds predominate. However, the pattern is complicated by rain which accompanies the development of unstable air during the period January to April. Similar windward and leeward effects can be identified on the islands in the Solomon and Coral Seas.

Local factors play a major role in the enclosed valleys of the central highlands. Air circulation is modified by factors which influence the production of mountain valley wind systems. Consequently rain tends to have distinct spatial and temporal distributions across and along the valleys. The seasonal lack of rain in lowland valleys e.g. Sepik Plains is thought to be related to hot descending winds (Brookfield and Hart, 1966).

Six categories of rainfall are present in Papua New Guinea, (see opposite.) *Continuously heavy rain:* large quantities of rainfall throughout the year, simple or double peaks of maximum rainfall may occur, especially on the southern flanks of the central mountain range and higher elevations on the offshore islands. Local factors may cause precipitation in excess of 10,000 millimetres to fall. *Moderate range-heavy to intermediate rain:* a seasonal trend is apparent due to local effects and the larger amounts of rain associated with the Inter-tropical Convergence Zone. *Continuously moderate rain*: this is represented by very small areas on the margins of the dry regions. Rainfall is moderate throughout the year, droughts or heavy rain being uncommon. *Large range-heavy to light, heavy dominant rains:* there are seasonal contrasts in rainfall with heavy rainfalls predominating. *Large range-heavy to light, light dominant rains:* there are seasonal contrasts in rainfall with light rainfalls predominating. Both this and the previous category have the heaviest rainfall associated with the presence of the Inter-tropical Convergence Zone. Lowest rainfall is associated with the low sun period. *Moderate range-intermediate to light rains:* this shows a seasonal contrast between light rains during the low sun period and intermediate intensity rains when the Inter-tropical Convergence Zone lies to the south of the country. Inland examples are related to orographic factors.

Temperature

Temperature contrasts, on a seasonal basis, are not large for most areas of Papua New Guinea. The accompanying table illustrates the lack of variation that exists in most stations. It is evident that temperatures are high throughout the year, with the average minimum temperature of lowland stations exceeding 20°C. The daily temperature range exceeds the seasonal temperature range. With an increase in height of the station the absolute and average temperatures decrease and the seasonal range tends to equal or exceed the daily range of temperature. Frosts are rare in Papua New Guinea apart from the upper slopes of the highest mountains.

Station	ht.m	Köppen Classif.	Av. Ann. Precip. mm.	Absol. max. °C	Av. max. °C	Av. temp. °C	Av. min. °C	Absol. min. °C
Daru	5	Am	2063	36.9	30.5	26.9	23.3	11.4
Kavieng	10	Af	3183+	37.8	30.2	26.3	22.5	15.6
Kerema	5	Af	3612+	35.9	29.6	26.2	22.7	14.4
Lae	10	Af	4617+	38.7	29.7	26.3	22.9	19.1
Losuia	3	Af	3942+	37.4	29.3	26.6	23.8	17.8
Mt.Hagen	1630	Cfb	2586+	31.1	23.7	18.3	13.0	1.7
Mt.Wilhelm*	3480	E	2633+	15.5	11.3	7.6	3.9	-0.8
Popondetta	85	Af	2482	37.2	31.2	26.4	21.6	7.2
Port Moresby	35	Aw	1197	36.3	31.0	26.8	22.6	10.4
Samarai	40	Af	2655	37.2	29.2	26.5	23.8	15.0
Wabag	1980	Cfb	3015	29.1	22.3	16.7	11.1	2.7
Wau	1065	Af	1667	34.1	28.2	22.3	16.5	6.1

Source: McAlpine et al 1975
*Hnatiuk et al 1976

Data for the maps and tables are drawn from McAlpine et al (1975). They provide a summary of the existing data to 1970. Supplementary information has been provided by the National Weather Service, Konedobu. The principal problem is concerned with the meaningful interpretation of incomplete data, a feature common to the majority of stations.

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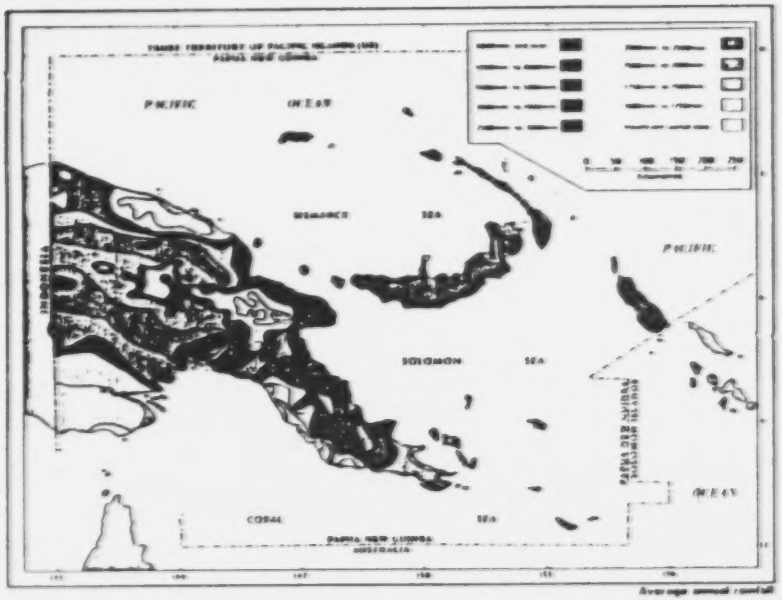
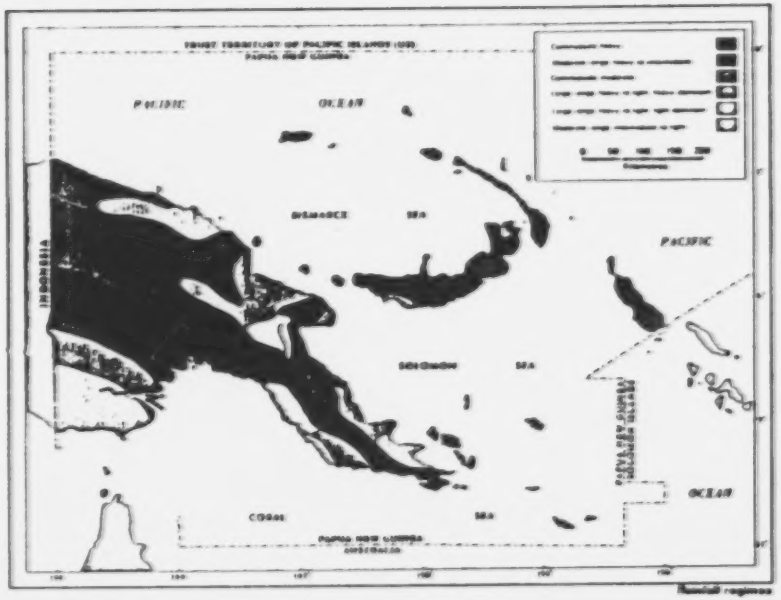
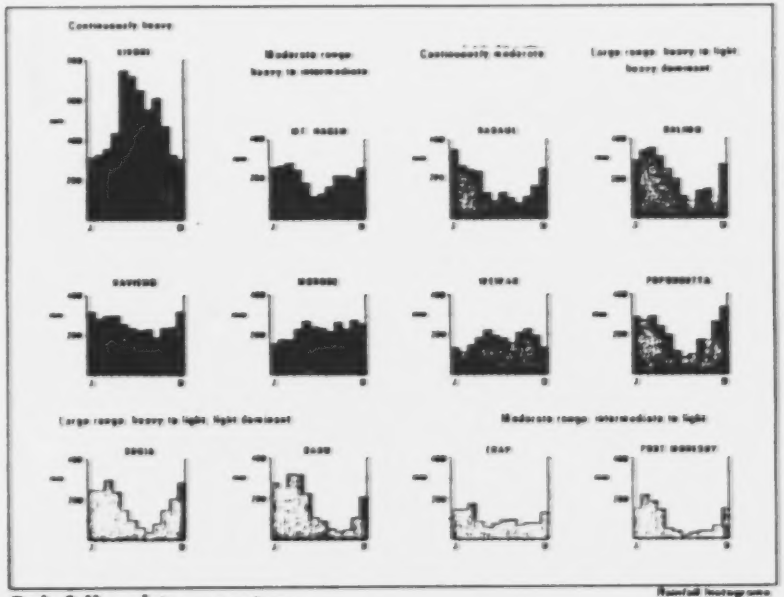
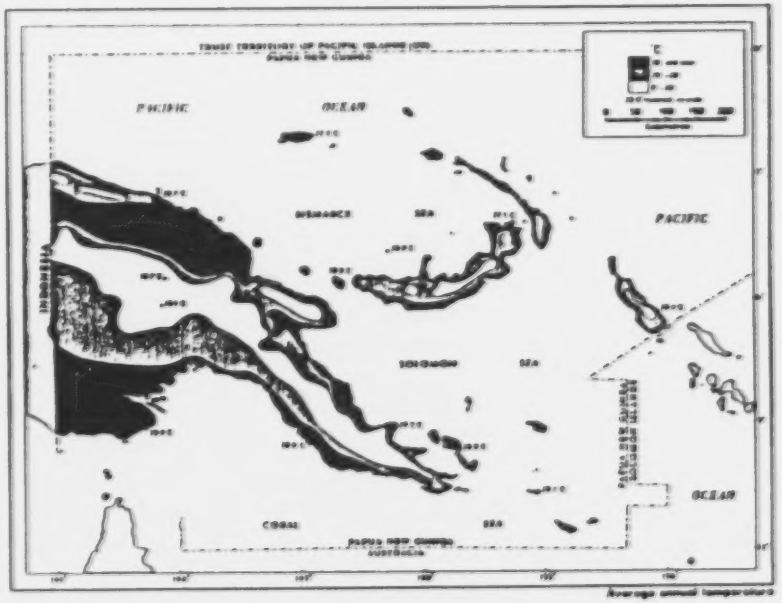





Continuously heavy
Moderate range heavy to intermediate
Continuously moderate
Large range heavy to light heavy dominant
Large range heavy to light light dominant
Moderate range intermediate to light



PROJECT 1 MY HOUSE & VILLAGE

READING TEXT 1 RAINFALL & TEMPERATURE

Tasks

1. Read the text. Make notes.
2. Look again at the 16 climate histograms given out last lesson.
3. Classify the 16 histograms into major climatic types.
4. Summarise the information in the text and the histograms in the form of a table.
5. Work in small groups.

Purposes

1. Classification of information from two different sources.
2. Note-making practice.
3. Summarising in the form of a non-linear text.
4. Introduction to variables. (There are 3 variables mentioned - what are they?)
5. Co-operation, i.e. working in groups.

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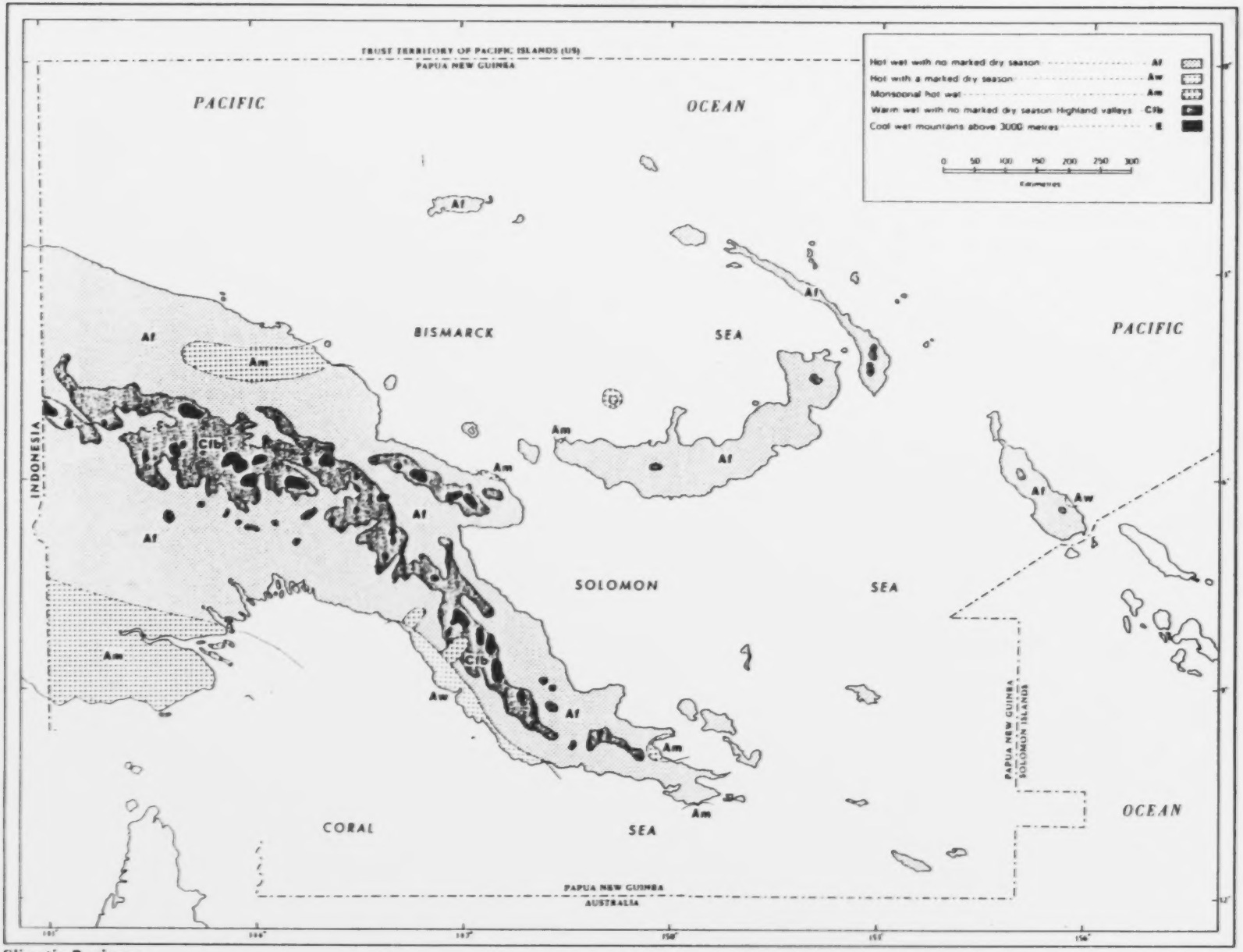

Climatic Regions

APPENDIX 3

Example of Student's Work

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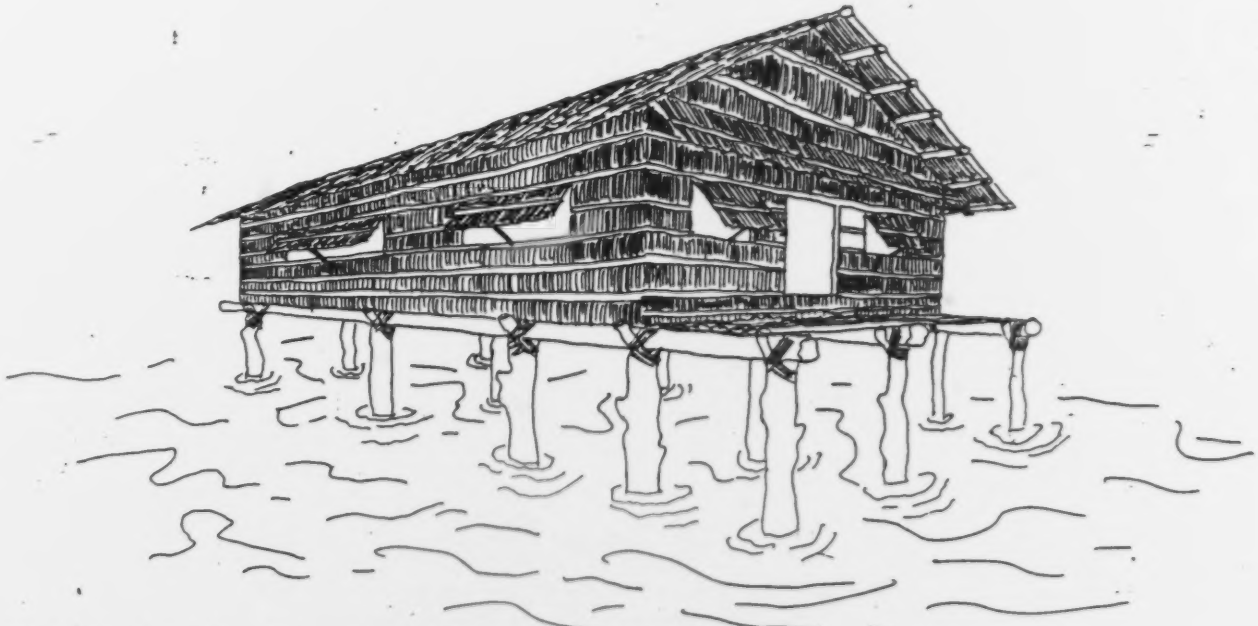
PROJECT 4 PART B

'MAN AND HIS ENERGY SYSTEMS'



This is a typical house of my people, 'the manus people'. The Manus people are great sailors, and they do not live on land because they spend most of their time sailing. The house which they regard as their true house, is their canoes of huge masses. They live on the canoe not like at the permanent house like the one drawn. The Manusians regard the permanent house as their second house for living in.

Another reason for the Manus people to built houses on the sea is for defensive purposes. Living on the sea protects by stopping their enemies from reaching them. The Manusians think their enemies do not know how to swim or get over the sea, because their enemies live all their lives on the land.

Apart from defensive purposes living on the sea provides them with fish as their main protien and they trade fish for [illegible] sago from the land people as their stable foods are fish and sago.

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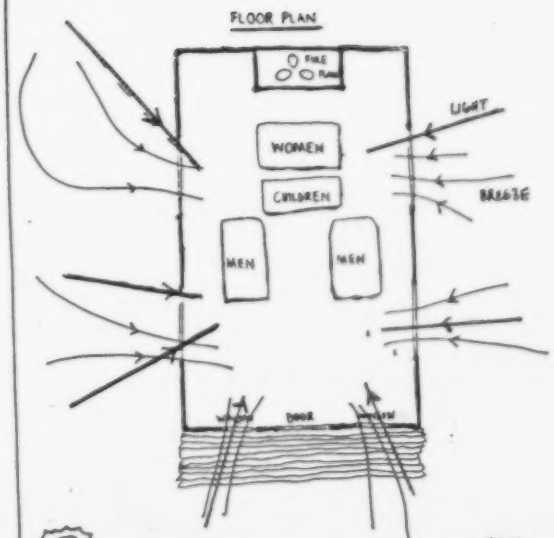
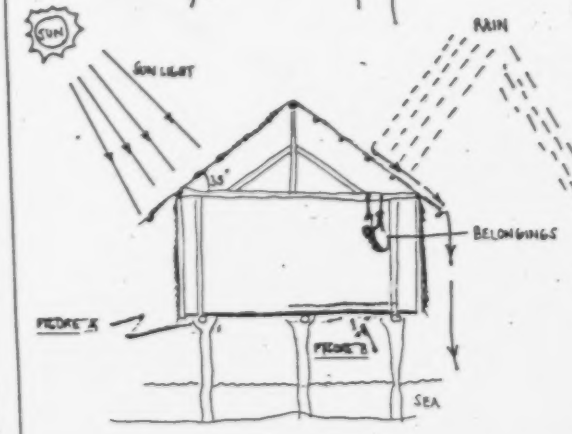
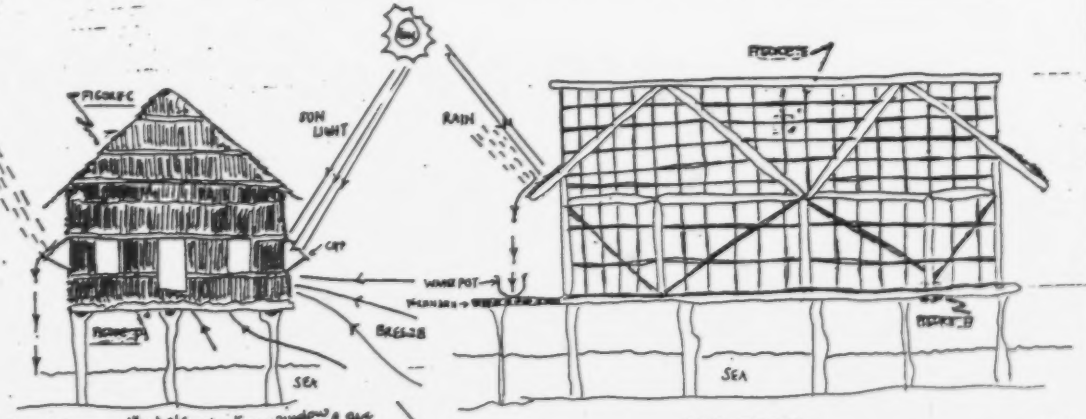
The floor plan illustrates how the traditional house is designed to allow for enough light and breeze to flow in. The builders do not understand the science of building, but however they know that a house needs enough lighting and breeze to make it a place to live in. Traditionally the people did not realise that to allow enough light and breeze into the house is for health reasons. The human body needs light from the sun and fresh air to maintain it. Also, the floor plan shows that the house is just a one room building. There is no privacy do that is why the house is not divided into rooms. The other reason for that is, if the house is divided into room then it will allow bad spirits to live in the house. Furthermore, the floor plan illustrates how the family live in the house. The women live near the fire because they are in charge of the kitchen. The children live next to the women because the women are more responsible for them. They sleep towards the door to protect the family from spirits and enemies because they are strong.

The cross section, illustrates where the belongings are kept. The belongings are hung in bags made from tree bark. The belongings are hung to provide more floor spaces. Hence receives more sunlight and rain so the roof of the house is designed, traditionally to provide shade from rain and sunlight. The roof is made of sago leaves. The leaves provide good shading, and it also allows for the rain to flow down easily to the sea. The roof is inclined at about 35° to encourage rain drainage.





CROSS SECTION



This diagram illustrates why the windows are designed with caps. The caps stop direct action from sun and rain to flow through the windows, as they can cause uncomfortness. To have yourself wet and hot, you will feel very uncomfortable.

During the day the windows are opened, and during the night they are closed. During the day they are opened for the purpose mentioned earlier on, and also for breezes to flow in to keep the house cool. During the night they are closed for protection from evil and enemies, and the women take part of allowing breezes to flow through the house.

LONG SECTION

The long section illustrates clearly, the purpose of having a cap in front over the doorway. The cap stops direct sunlight and rain to flow to the door. The doorway is kept dry and cool, and inviting. When a visitor comes to the house he will feel being invited when he enter the doorway. Furthermore, the cap collects rainwater for use. When rain falls on the cap, the cap directs it to a pot made of clay placed on the verandah. And the water is then used for cooking.

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FIGURE E

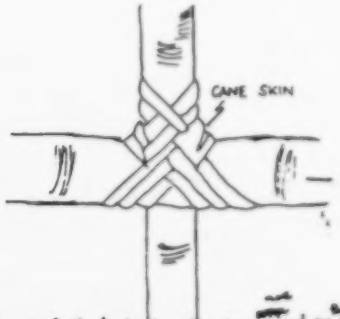
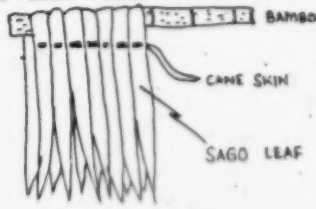


Figure E, illustrates how the posts, used as roof, are tied together. The posts are tied with cane skin. The cane skin is very strong, and it lasts as the house. The knot used is called 'BAUL'. The knot ties the two trees together very strongly and it provides less chances of movement by the trees due to natural forces like wind and gravitational forces like the weight of the roof cover.



This diagram shows how the roofing is made. The roofing is made out of sago leaves folded over a 4 meters bamboo and later sewn by cane skin. Figure C illustrates how the roofing is placed onto the roof.

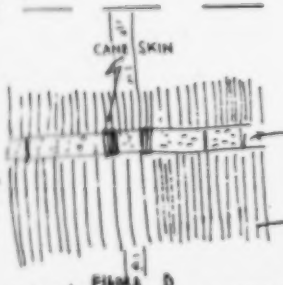


FIGURE D

This diagram shows a bamboo frame onto the sago leaves are placed on the walls to stop the rain from flying inside. Flying inside is necessary by the wind. This place is exposed to the North west wind which blows very strongly during the months of December, January and February so that ideal illustrated is effective during that time when

This diagram shows how a post is planted into the sea bed. The post used is mangrove tree because it lasts long. Two ropes are tied onto the tree, and two people hold onto each rope and pull and release. When the other two push, the other two release 'go'. When the post moves side to side to provide a movement that allows the post to sink into the soft seabed.

FIGURE F

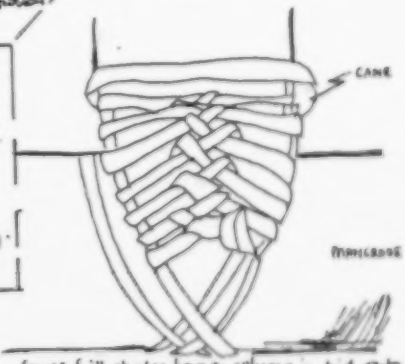
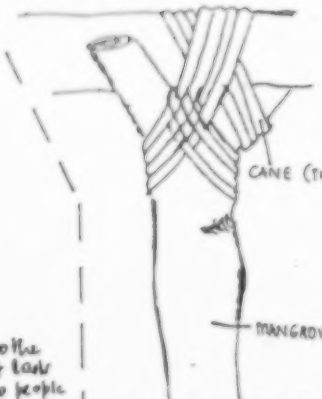


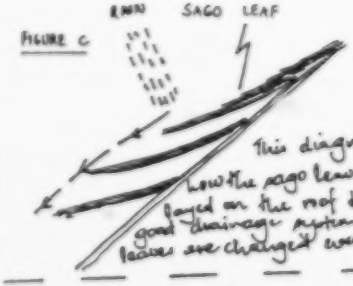
figure F illustrates how a column is tied onto a horizontal wood that is on the floor. The material used is cane. This type of tie is called "post". Post is used on condition where a column is to be joined a wood that is horizontal. The cane withstand rain and it lasts long.

FIGURE A



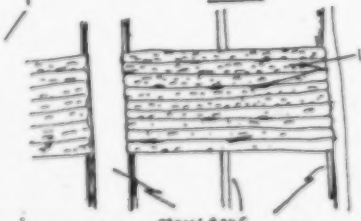
This diagram illustrates how the post is tied onto the floor. This way of tying is called "PITOU". It is said that this way of tying lasts long.

FIGURE C



This diagram shows how the sago leaves are layed on the roof to provide good drainage system. The sago leaves are changed every 7-10 years.

FIGURE B



This diagram illustrates how the floor is assembled. The floor is made up of 'Limbum' layed adjacent to each other on the main supports provided by mangroves

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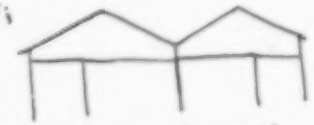
The long sections illustrate the frames of the whole houses. The house is mainly supported by the big frames of timber fixed in nearly the centre. This is the structure of the supports;



. The main supports are made from frames

more by the small cross-frames. ie.

In the diagram, it shows a verandah in front of the house. This verandah is used for resting at night, and as a place to sit and fish during the night. The verandah is used as a [illegible] for people to get from their canoes. The people move from house to house by canoes. Also, the houses are linked with bridges, so the people walk on bridges from house to house.

Yes, you have a very attractive way – and your work is not [illegible] and interesting. Your line drawings are lovely.

Perhaps the most obvious weakness in the whole presentation is the lack of an ever-all plan or 'bird's-eye-view' showing the village as a whole and its proximity to land, and the directions of the wind, sun, and seas. (If you had a planning rule you might have seen this lack yourself.)

A

K.B.

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